

A COMPARATIVE STUDY OF THE BODY MEASUREMENTS
OF A SELECTED GROUP OF WOMEN WITH THOSE
OF CERTAIN COMMERCIAL PATTERNS

by

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INTRODUCTION

Ever since that revolutionary adjustment in the industrial world which brought about the factory system and quantity production of garments, there has been a need for a uniform system of standardized sizes in the clothing industry.

As the industry has grown from the manufacture of simple uniforms for soldiers to the manufacture of every type of clothing worn by man, woman or child, the need for standardization of sizes has become not only a problem of the manufacturer of ready-to-wear garments, but also the problem of the pattern maker, the dress form manufacturer and the consumer as well. Both the garment and the pattern manufacturer, in particular, find themselves confronted with the problem of how to fit the greatest number of individuals possible with the least adjustment.

The dilemma of the manufacturer in knowing how to scale his sizes and conserve material, the outlay of money by the merchant for alterations in fitting, the waste of material by the home seamstress in using variable patterns point to an economic need for standardization. The con-

sumer often pays highly in time and money, sometimes with unsatisfactory results, for alterations necessary under the existing order. The increased satisfaction given both manufacturer and consumer by easily adjusted garments and patterns is no small item.

Those accustomed to the buying of ready-to-wear clothing realize that women have more difficulty to obtain their correct size than men do, and that more alterations are necessary in women's clothing than in men's clothing.

This is probably due to two reasons: first, men are not so difficult to fit, for their bodies are more uniform in shape at the different ages and in different sizes; second, thousands of men have been measured on enlisting for army service and therefore the variations in measurement have been recorded. In fact the first move toward standardization was made in the attempt to fit each man with a uniform. At first it was a very crude and ill-fitting garment until by trial and error the neat tailored garment of today has been evolved.

Before a reliable and satisfactory system of standardization may be formulated, it will be necessary to measure thousands of subjects. This is not an easy task to accomplish. The united effort of the commercial concerns in-

terested and the consumer alike will be necessary. Both are beginning to realize at the present time that standardization of sizes would be desirable. This work should be in the hands of some reliable organization with sufficient authority and enough money to conduct a systematic research for taking the body measurements required for cloth-construction. Then a systematic and uniform plan of determining sizes that would conform to the body measurements of the majority should be adopted.

Since, then, there is a real need for standardization of sizes, and since, so far, very little, if any, progress has been made in obtaining that standardization, it has seemed of sufficient importance and interest to make a study of that phase of the subject dealing with the deviation that exists in certain commercial foundation patterns of a given size and a comparison with the median body measurements of a random sampling of women of the given size.

PURPOSE

The purpose of this study, then, is:

1. To ascertain the distribution of body mass of

a group of mature women of similar weight, height and bust measure.

2. To determine the differences between the norms found and the measurements of commercial patterns of similar bust measure.

3. To determine whether there are more inaccuracies in measurements and parts in some patterns than others.

4. To interpret the data collected and summarize the findings made in order to add to the information already available.

REVIEW OF LITERATURE

In reviewing the literature relating to the subject under discussion, one discovers that the taking of measurements of the human body is not new but has been used in many fields of activity, including both art and science.

The artist's interest lies not so much in actual physical measurements as it does in proportion, the beauty of relationship of the parts to the whole. The systems of body proportions developed were usually based

upon the head as the unit, the other parts of the body being in a consistent relationship.

John Marshall, an artist of a later time, devised a system of proportions based upon the measurement of what he considered the correct proportions of the ideal man and the ideal woman, each a model in his studio. The head, the unit of measurement, was composed of nine units, each unit .933 inches in length (1) for the women. The measurements of length, breadth and depth of different parts of the human body in both sexes found according to the "Rule" prescribed coincide in a remarkable manner with the proportional measurements assigned to corresponding parts under the best recognized systems such as Quetelet, Carns, Liharzik, Hay and Zeising (1). The girth measurements are not given.

More recently, a study was made by Harriet Goldstein, Associate Professor of Art, and Vetta Goldstein, instructor of Art at the University of Minnesota, to determine the number of heads in length of the average woman's figure (2). Three hundred fifty women were measured. They have worked out a system of proportions for the average figure, the fashion plate figure and the girlish figure. Longitudinal and width proportions valuable to the de-

signer of clothing are given, but girth proportions needed by the manufacturer of clothing are omitted.

It would seem that the clothing trade should be able to get valuable data on body measurements from such sources as Departments of Physical Education of colleges and other schools, insurance companies and the United States Army and Navy.

"During the period from 1890 to 1910 many physical directors in the colleges and universities were deeply interested in body measurements as an indication of the physical status of the students. As a result standardized methods of taking and recording these measurements were worked out, and a great many detailed measurements were made on students enrolled in physical training classes. Some studies were published, but unfortunately many measures were taken unscientifically and even those most carefully done were based on body landmarks which make them useless in garment and pattern manufacture" (3).

Such colleges as Vassar, Smith and Pratt have contributed some helpful statistics of measurements of sizes and proportions for women (4).

There are many published reports of measurements of children. These were taken in the study of growth and

development and usually included only height and weight (3). The published measurements of insurance companies, too, include only height and weight.

There is a vast amount of data available from the United States Army and Navy accumulated since the Civil War. But these measurements of men taken upon their enlisting include, with few exceptions, only height, weight and chest measurements and are of little value to the clothing trade, since, with the exception of the study made by Love, Ireland and Davenport at the close of the World War, they were not taken with that purpose in view (3).

Although there are so many sources of information on physical measurements little of it can be utilized directly in the manufacture of garments or of patterns. The published measurements used in the clothing trade seem to be based on traditional ideas rather than actual measurements of people. In the few cases in which studies have been mentioned procedure and data are omitted (3).

It is unfortunate that the very sources that could contribute measurements of large numbers of individuals have limited the measurements taken to height, weight and possible chest measurements. If the measurements had been scientifically taken, these sources could contribute

large enough samples to be of constructive value to commercial concerns. With large numbers of measurements it would be possible to determine mathematically the sizes that could be worn by the greatest number of individuals. "When dealing with large numbers, the proportions of the body are on the average very constant" (5).

"Distribution of sizes when put into graphic form assumes a bell-shaped curve. This point is of practical value in working out either theoretically or practically a proper distribution of sizes for clothing of any kind for men or women or children" (4).

There is a paucity of literature of a specific nature on the subject of standardization of sizes. So far as known, three studies have been made of sizes found in commercial patterns and ready-to-wear garments.

Weirick found that no standardization of measurements existed and that manufacturers differ in size furnished for given age. Measurements were apparently collected in different ways (6).

Mary Alice Dunn and Katherine Taylor Cranor of Iowa State College made a study (7) of eleven commercial patterns compared with one hundred-four ready-to-wear dresses in sizes 32 and 42. They discovered considerable

variation in pattern sizes and irregularity in measurements in the same pattern. The same lack of uniformity was found in ready-to-wear dresses. The study showed a need for standardized measurements for patterns and garments (6).

Ruth Clayton and Ethel L. Phelps of the University of Minnesota made a pattern study of five different makes of commercial patterns size 34. Wide variation was found to exist in the measurements of the same sizes. The larger sizes were especially variable. Price also seemed to be a factor in accuracy of measurements (6).

Only one study, so far as known, has been made where the physical measurements of a group of people have been compared with the sizes found in patterns. This study was made by Caroline B. Little at the University of Minnesota in 1928. She compared the measurements of 245 girls and misses between the ages of 8-18 years of age and 318 women, with eight different makes of commercial patterns. She found a wide variation in the measurements in various makes of same size.

The variation was greater in girls' and misses' patterns than in women's patterns.

Some patterns increased in a relatively uniform

manner and showed a trend common to the physical measurements, but with the general tendency to be larger. In women's patterns the measurements conformed more closely to the median physical measurements, but in some important instances the patterns failed to agree with either median or maximum physical measurements.

The greatest deficiency in the sleeve was in the length (6).

A study already mentioned, that of Love, Ireland and Davenport, made at the close of the recent war, is the only published report of a study of this kind made with clothing construction definitely in view. The measurements of 100,000 men were taken according to scientific methods. The purpose was to establish proper sizes in the construction of uniforms (3).

The human figure is a variable factor that must be considered in any system of size standardization. No two individuals are alike.

There are several factors that contribute to individual differences, such as race, nationality, food, glands, exercise, posture, sex, and locality. These all modify the growth and development of the body and make uniform sizes for certain ages difficult to ascertain, especially

at the period of greatest growth, the period of childhood and adolescence.

After maturity, the body changes little longitudinally but at middle age there is a tendency to increase in weight with the accompanying expansion of body width and girth. Usually this is due to a surplus of fat. Body fat accumulates by increased food intake or decreased physical activity. At middle life there is a tendency to a slowing down of activity while the same amount of food or more may be eaten with the consequence of added weight. The hips especially receive an extra amount of this padding, although the whole body becomes more cylindrical. The endocrine glands are also believed to play a large part in the change that takes place in a woman's body at the menopause. Abnormality in any gland may produce hunger so that the person is led to eat above his actual needs, or it is possible that the abnormal activity of the gland produces sluggishness so that physical activity is curtailed. Obesity may come as the consequence of depression of the thyroid, which lowers the capacity of the tissues to oxidize the foods, and foods not oxidized are usually deposited as fat. The pituitary gland is recognized as the cause of a certain form of adiposity due to some

injury to the brain near this gland. This form of obesity is marked by an accumulation of fat in and around the mammary glands, on the abdomen, and on the thighs (8). This change in form and tendency to obesity involves a serious problem in garment fitting.

Poor posture is conducive to irregularities in body contour with measurements increased at some points and decreased at others. The habits of posture acquired when younger now become settled and exaggerated. The body, instead of being held erect, is allowed to slump and thus increase the size of the lower part of the trunk.

Only in recent years have manufacturers and pattern makers considered the needs of the larger woman, and even now few manufacturers have made a definite study of sizes. Instead they have used the trial and error method in correcting their scale of sizes from season to season by a process of elimination, which is not altogether satisfactory. The Associated Knit Underwear Manufacturers of America are the first, definite and scientifically, to standardize garments fitted to the trunk measurements. The Association established a Research Fellow at the United States Bureau of Standards, Washington, D. C. charged with the technical and scientific details of standardization. The sizes are standardized for men's, boy's

and children's knit cotton union suits. The general method of procedure was to collect data from each manufacturer, on each particular type of union suit, for each dimension. Fifteen measurements were taken on each garment and ten garments of each size were measured. Averages were calculated of the total data on each size. This gave the mathematical average of the present-day practice. Then comparisons were made with the measurements most commonly used for each dimension of a union suit. The Standardization Committee decided upon the most practicable selection and submitted their decision to the General Association for adoption. The Association purposes to benefit the industry by issuing a license to use the standard label whether the manufacturer belongs to the Association or not. This label indicates the size and measurements of the garment so marked (9).

On April 17, 1929 a conference of representative manufacturers, distributors and buyers of boys' blouses, button-on waists, shirts, and junior shirts adopted a commercial standard for these commodities. The industry has since accepted and approved for promulgation by the Department of Commerce, the original standard with certain minor modifications in accordance with the revised draft

dated April 19, 1930. The standard to become effective on June 1, 1931 (10).

On May 3, 1929 a similar conference of manufacturers, distributors and users adopted a commercial standard for men's pajamas. The standard became effective January 30, 1930 (11). A certification plan was approved. The certification plan as applied to commercial standards by the National Bureau of Standards consists in compilation and distribution of lists of manufacturers who are willing, when requested to do so, to certify to purchasers that products supplied by them comply with all the requirements and tests set forth in nationally recognized commercial standards. The plan is also applied to selected Federal Specifications (10).

In February of the same year a commercial standard for dress patterns was adopted by a conference of manufacturers, merchants, educators and users (12).

Three preliminary conferences had been held in 1928 in which recommendations were made covering pattern classifications, grading, body measurements and widths of material to be recognized for pattern layouts. A study was also made of the various reports covering anthropometric measurements, checking this data with the general experi-

ence of each manufacturer. The final recommendation adopted was a rather practical compromise between such measurements, the experience of dress pattern manufacturers, and their commercial practice, and will provide approximate dimensions to suit average requirements, bearing in mind that final fit is established by adjustments to suit the individual (12). It became effective January 1, 1930. The adoption or acceptance is voluntary on the part of manufacturers.

The present status of standardization shows its economic advantage to manufacturer and consumer. Everything that has been done in that direction is commendable, but it is evident that little so far has been done in the taking of actual body measurements of large groups of people. Until this can be accomplished through a systematic and scientifically planned method, wholly reliable and satisfactory standards of measurements will not be available.

"The science underlying correct garment and pattern sizes is anthropometry, the science of human physical measurements. It is well developed, with standardized methods and instruments, but is so highly specialized that it is perhaps not so widely known and appreciated as many

others. Any investigations made for the purpose of setting up suitable garment measurements should utilize the progress already made in this science" (3).

"Science as it develops, advances through the stages of measurement and calculation. Our object is to consider the methods and, in some small part, the accomplishments of those students of mankind who have studied human individuals for the purpose of basing broad and permanently valuable mathematical generalizations on masses of measurements" (5).

PROCEDURE

The plan of procedure in making this study included the selection of a group of women, and decisions on the equipment to be used in taking the measurements, on the measurements required, on taking accurately these body measurements and on the best method of recording the data obtained.

It was decided that the mature woman, in size 40 bust, should be the subject. The equipment consisted of four new, stitched, cloth tape measures, one for taking the measurements, the other three to be used for location lines at bust, waist and hips. Pins were used to pin tapes in

place, a soft crayon for making other location points on the body. A ruler was used with the tape in determining the under arm measurement and the height. A long pencil would serve the same purpose. The scales used were arbitrary, the individual being weighed and reporting weight.

The plan first required the listing of height and weight and the taking of trunk measurements and sleeve lengths, only, and included the following:

- | | |
|---------------------------|-------------------------------|
| 1. neck | 16. center shoulder to chest |
| 2. chest line | 17. center shoulder to bust |
| 3. width of back | 18. center shoulder to waist |
| 4. waist line | 19. center shoulder to hip |
| 5. bust | 20. neck to back width (back) |
| 6. distance between | 21. neck to bust (back) |
| points of bust | 22. neck to waist (back) |
| 7. hip line | 23. neck to hip line (back) |
| 8. shoulder line | 24. total front length |
| 9. armseye | 25. total back length |
| 10. underarm to waist | 26. outer sleeve length |
| 11. underarm to hip | 27. inner sleeve length |
| 12. neck to chest (front) | height |
| 13. neck to bust (front) | weight |
| 14. neck to waist (front) | |
| 15. neck to hip (front) | |

Later it was decided to add the following measurements:

- | | |
|-----------------------------|-----------------|
| 28. length of sleeve cap | 34. front neck |
| 29. sleeve width at largest | 35. back neck |
| part of arm | 36. front bust |
| 30. cap to elbow | 37. back bust |
| 31. elbow to wrist | 38. front waist |
| 32. width at elbow | 39. back waist |
| 33. width at wrist | |

The measurements were taken without dress but with underwear and slip as usually worn. The height was taken in the stocking feet. All measurements were taken by the one making the investigation and in the following manner.

Neck line. The neck line was located by a tape measure encircling the neck at its base, just above the prominent bone at the back of the neck, meeting at the hollow of the neck in front and pinned in place; the size was noted and recorded, then with the crayon, a line was marked around the neck at the lower edge of the tape line. This line was used for the location of the relative distance of other points on the body.

Chest line. The chest line was determined by locating a point on each side of the front of the body, just below the shoulder where the arm raised at right angles to the body separates from the body. These points were marked and the distance between the two points plus one inch was recorded as the chest line. The location of this line was drawn at the lower edge of the tape line.

Back width. The back width was located by determining the point on both sides of the back of the body at the point just below the shoulder where the arm, when raised at right angles to the body, separates from the body.

These points were marked on the body; the distance between them was the back width. A line was drawn across the back at the lower edge of a tape line connecting the two points.

Waist line. A tape line was placed around the figure at the smallest part of the trunk, which is between the lowest rib and the top of the protruding portion of the hip bone. The size of the waist was noted and recorded and the tape pinned in place for a location line.

Bust line. This measure was taken by standing behind the person being measured, who folded her hands so that the tips of the thumbs could easily be placed over the points of the bust. The tape was placed over thumbs, under the arms and across the lower shoulder blades, meeting at center back. The tape measure was then raised to one inch above this point for sufficient fullness. The tape was pinned in place. The size of the bust was recorded and also the distance between the points of the bust.

Hip line. This line was located by having the subject place tips of the thumbs on the tape marking the waist line, just above the hip bone. With the hands extended, the tips of the middle fingers were the points locating the hip line. The tape encircled the hips at these points meeting in front where it was pinned firmly and left for a location line. The size was noted and recorded.

Shoulder line. The subject held the head so that the face was directly in front of the body, and a pencil was placed on the crest of the bone behind the ear, held parallel with the center back of the neck and touching the neck line. This point was marked with the crayon and indicated the point where the shoulder line began. The outer point of the shoulder line was found by placing the thumb and first finger on the prominent bones on either side of the highest point of the shoulder, bisecting the distance between, and marking this point as the end of the shoulder line. The distance from the point on the neck line to this outer point was recorded as the shoulder line.

These points, with the points marking the chest line, indicated the location of the armseye.

Armseye. With the arm dropped at side, the tape encircled the arm at location of the armseye and met at the shoulder. This should be the same measurement as the one taken with the arm extended at right angles to the body and the tape placed tightly around the arm as high as possible, plus two inches. This measurement should agree with the first measurement. Both were used as a check for correct measurement of the armseye.

Under arm. A tape line was folded over the ruler at a known number on the tape and placed under the arm as high

as possible. The arm was dropped at the side to hold the tape in place. The point on the waist line where the tape fell was the under arm length, and the length to the point where the tape touches the hip was also recorded.

Neck to chest line, to bust, to waist, to hip. These measurements were taken from the center of the neck line in front to the chest, then from the neck to the bust line, from the neck to the waist line and from the neck to the hip line. Each of these measurements was recorded.

A record was also made of the length of a line dropped from the center of the shoulder line, parallel with the armseye, to the chest, then parallel with center front to the bust, then to the waist line, then to the hip line. A measurement was recorded for each of the lengths found from the neck line at center back to the back width line, to the bust line, to the waist line and to the hip line.

Total front length. This measurement was taken from the neck line in center front straight to the floor.

Total back length. This measurement was taken from the center of the neck line in the back straight to the floor.

Outer sleeve length. This measurement was taken with the right arm akimbo. The distance from the point on the

shoulder where the shoulder line ends, over the bent elbow, to the point below the protruding bone of the wrist was the outer sleeve length.

Inner sleeve length. The inner sleeve length was taken as the distance from the point next to the arm indicating the chest line, along the inner side of the slightly extended arm, to the point where the wrist joins the hand.

Cap depth. The cap depth was located by pinning a tape line around the arm, dropped at the side, so that the tape crossed the lower part of the hollow of the arm, straight around the arm meeting at right angle with highest point of shoulder. The distance from the point where the shoulder line ends to the lower edge of the tape line was the length of the cap.

The distance from the cap to the elbow and the distance from the elbow to the wrist was also found and recorded.

The elbow. A measurement was taken around the elbow, with the arm dropped at the side.

Size of the wrist. The size of the wrist was determined by placing a tape around the wrist just above the prominent bone in the wrist.

Front neck. The front neck was the distance on the base line of the neck, between the point where the right shoulder begins and the point where the left shoulder line begins.

Back neck. The distance from the point where the right shoulder line across the back, at the base of the neck, to the point on the shoulder where the left shoulder line begins was the back neck line.

Front waist. The front waist was the distance between the point where the right under-arm seam bisects the waist line around the front, to the point where the left under-arm seam bisects the waist line.

Back waist. The distance between these same two points across the back gave the back waist measurement.

Front bust. The front bust was that distance from a point on the bust line directly below the center of the hollow of the arm, across the front following the bust line to a similar point under the left arm.

Back bust. The back bust line was the distance between these same two points, but across the back along the bust line.

Height. This was taken with the subject in stocking feet and standing against a door jamb with heels touching

the surface of the jamb. A ruler was placed level on top of the head, and the point where it touched the wall was marked as the height of the individual.

Weight. The weight was taken of the preliminary group on the scales used in the nursery school at this college, but later the weight on any reliable scale selected by the individual was accepted, as reported by the subject.

The measurements of a preliminary group of eleven women were taken to determine the possible range of height, weight and bust for size 40. These women were delegates to the Farm and Home Week meeting held at Manhattan in February, 1931, who expressed their interest in the study by volunteering to be measured. The measurements of this group were recorded on a temporary sheet of the same form as the permanent sheet, Page 25.

Although size 40 bust was supposed to be the size, it was found in this preliminary group that the measurements varied from 39.25 to 46 bust. The height ranged from 61.75" to 66" and weight from 140 pounds to 194.25 pounds. From this group was derived the possible range of measurements for this study and were:

Bust 40-44
Height 5 feet to 5 feet 6"
Weight 140 pounds to 180 pounds

This plan was slightly modified in the final data. The group to be measured was to be mature women; age was not recorded but in most cases it included the older women near forty and above. The measurements of at least fifty women was the goal set. A form for recording the data was planned so that at a single glance a measurement could be determined or a comparison made with similar measurements without the difficulty of searching for the required number.

Form of Record

| Names | R. | K. | N. | B. | J. | E. |
|------------|--------|--------|--------|--------|--------|--------|
| | Mrs. | Mrs. | Mrs. | Mrs. | Miss | Miss |
| Measures | 1 | 2 | 3 | 4 | 5 | 6 |
| neck line | : 15 | : 17 | : 15.5 | : 16 | : 15.5 | : 16 |
| F. neck | : 9 | : 10 | : 9 | : 9 | : 9 | : 9 |
| B. neck | : 6 | : 7 | : 6.5 | : 7 | : 6.5 | : 7 |
| chest line | : 14.5 | : 13 | : 15 | : 13 | : 13 | : 14.5 |
| back width | : 12.5 | : 15 | : 15.5 | : 13 | : 14.5 | : 14 |
| waist | : 33 | : 38 | : 41 | : 34 | : 35 | : 36 |
| F. Waist | : 19 | : 21 | : 23 | : 17.5 | : 20 | : 21 |
| B. waist | : 14 | : 17 | : 18 | : 16.5 | : 15 | : 15 |
| hip | : 42 | : 43.5 | : 48 | : 40 | : 43 | : 45 |

Including the eleven measurements of the preliminary group, a total of fifty-seven measurements was taken and recorded. Fourteen measurements were taken of women living in Manhattan and vicinity. Thirty-two measurements were taken of women living in Hays and vicinity. The group was composed of a fairly proportionate number of rural and of urban women and seemed to be a good sample of the larger woman found in the small city and in the rural communities.

The cooperation on the part of the women in consenting to be measured was all that could be desired. Many expressed their interest and willingness to help. Several actually inconvenienced themselves in order to permit their measurements to be taken. Interest was also manifest on the part of those outside the group and often help was proffered in procuring subjects for the research.

There are a few difficulties encountered in conducting a study of this kind. It required from one-half to three-quarters of an hour to take and record the measurements. Some individuals are not able to stand quietly for that period of time without becoming faint, and must be allowed to sit while the measurements are taken that do not change in either a sitting or standing position.

Another difficulty is to secure the individual with

the required qualities. The bust may be size 40, but the person may be under or over the required weight or may be either too tall or too short. Wide deviations from the limits chosen were found to exist.

Then there is the difficulty of finding a sufficient number of size 40's. Sometimes the woman says she is size 40 but on taking the measurements she proves to be larger. A few 38's were measured with a hope in that way to get a few size 40's. A tendency was noticed on the part of some of the larger women to under-estimate their size. Although this may not be general, it was borne out by the observations of two interested clerks in dress shops who have to use as much tact in selling dresses of larger size as the shoe man does who fits large feet with supposedly small-size shoes.

Another difficulty is the possibility of errors. There is variation in the way measurements are taken at different times by the same person; then with some subjects the location points on the body are more difficult to find than on others. Some of the difficulties would be overcome by having larger groups to measure at one time. A suggested plan would be to take the measurements of a large number of women, say 500 or a thousand, regardless of height, weight or bust measure, and then classify like

sizes together; by this method large groups of the same size could be secured. When the survey was completed, fifty-seven measurements had been taken, but the bust size ranged from 36.5 to 46; therefore everything above 44 and below 38.5 was discarded, making a loss of seventeen measurements. The data for the remaining forty measurements were transferred to one large sheet and tabulated in the following form.

Table I. Body Measurements of Forty Women.

| No. | Bust size | Height | Weight | Hip | Waist | Neck | Chest | Width back | Shoulder line | Armseye | Front: length | Back: length | F. neck: to chest | F. neck: to bust | F. neck: to waist | F. neck: to hip | B. neck: to B. bust | B. neck: to waist | B. neck: to hip | Outer sleeve | Inner sleeve | Under arm to waist | Under arm to hip | Distance between points | C. shoulder: to chest | C. shoulder: to bust | C. shoulder: to waist | C. shoulder: to hip | | |
|-----|--------------|--------|--------|------|-------|-------|-------|---------------|------------------|---------|------------------|-----------------|----------------------|---------------------|----------------------|--------------------|------------------------|----------------------|--------------------|-----------------|-----------------|--------------------------|------------------------|-------------------------------|--------------------------|-------------------------|--------------------------|------------------------|-------|-------|
| 1 | 43.5 | 65.5 | 182 | 45.5 | 36 | 16 | 15 | 13 | 5 | 18 | 57.5 | 59.75 | 3.25 | 9.5 | 15.5 | 23 | 5.25 | 8.5 | 15.5 | 25.25 | 25 | 20.5 | 8 | -9 | 17.5 | 8.5 | 5.5 | 11.75 | 17.75 | 25.5 |
| 2 | 43.5 | 66.25 | 175 | 43.5 | 36.5 | 15 | 13.5 | 13 | 5 | 18 | 58.5 | 60 | 3.75 | 12 | 17 | 24.25 | 5 | 9 | 15.5 | 25 | 25 | 22 | 8.5 | -8.25 | 17.5 | 9.5 | 5 | 12.25 | 18.25 | 25.25 |
| 3 | 43.5 | 61.75 | 141.5 | 42.5 | 34 | 15 | 13 | 13.5 | 4.5 | 17 | 53 | 55 | 3 | 9.25 | 14.25 | 21.5 | 5.5 | 9 | 14.25 | 21.5 | 23 | 19.5 | 8 | | 15.25 | 9.5 | 5 | 11.25 | 16.25 | 23.5 |
| 4 | 43.25 | 61.75 | 158.25 | 43.5 | 33.5 | 15.5 | 16.25 | 14 | 4.5 | 19 | 54.5 | 55.5 | 3 | 10.5 | 14.5 | 23 | 4 | 8.25 | 15 | 23.5 | 23.25 | 20 | 8.5 | | 17.5 | 8.25 | 5.5 | 13 | 17 | 25.5 |
| 5 | 43.25 | 67.5 | 174 | 44 | 35 | 15.5 | 13.25 | 13.5 | 5 | 18.5 | 56.5 | 59 | 2.5 | 9.5 | 15.25 | 23.75 | 6 | 8.25 | 17 | 25 | 25.25 | 21.25 | 8.25 | | 16.25 | 8.5 | 5.25 | 12.25 | 18 | 26.50 |
| 6 | 43 | 66.25 | 165 | 43.5 | 38 | 17 | 13 | 15 | 5.25 | 20 | 56 | 59.5 | 2.75 | 8.5 | 14 | 22.5 | 5 | 9 | 18 | 26.25 | 25.25 | 20 | 9.5 | -9.25 | 17 | 8.5 | 6 | 10.75 | 17 | 26 |
| 7 | 43 | 65.25 | 178 | 42.5 | 37 | 16 | 14 | 14 | 5 | 17.5 | 56.75 | 59.5 | 3.25 | 9 | 16 | 22.25 | 5 | 9 | 16.25 | 24 | 24.75 | 20 | 9 | -10 | 17 | 8.5 | 5.5 | 10.5 | 18 | 24 |
| 8 | 43 | 62.75 | 156.75 | 46 | 39 | 15.25 | 12.75 | 13.5 | 4.5 | 18 | 54.25 | 56.25 | 2.5 | 7.25 | 13.25 | 21.5 | 5 | 8 | 15.25 | 23.25 | 24.5 | 21 | 8 | | 16.25 | 9.5 | 5 | 9.75 | 15.75 | 24 |
| 9 | 43 | 63 | 175 | 45.5 | 36.5 | 14.5 | 14.5 | 14 | 5 | 18 | 55 | 56.25 | 3 | 9.25 | 15.75 | 22.75 | 5.5 | 9.25 | 15.25 | 23.25 | 24 | 18 | 9 | | 16 | 8 | 6.25 | 12.5 | 19 | 26 |
| 10 | 42.25 | 62.75 | 152.75 | 42 | 33 | 15 | 13 | 13 | 5.25 | 18 | 54.5 | 56.5 | 3.25 | 10 | 14.5 | 22.5 | 5.5 | 10 | 15 | 24 | 25.25 | 21 | 8 | | 16 | 8.5 | 5.5 | 12.25 | 17 | 25 |
| 11 | 42 | 65.5 | 156.75 | 44 | 32.5 | 16 | 13.25 | 13.5 | 5 | 19 | 57.5 | 58 | 3 | 9.5 | 14 | 23 | 5.75 | 8.5 | 15 | 23.5 | 25 | 22 | 8 | | 17 | 8.5 | 6 | 12.5 | 17 | 26 |
| 12 | 42 | 65.5 | 160.5 | 49 | 37 | 15.5 | 15.5 | 14 | 5.5 | 18 | 57.75 | 59.75 | 3 | 10.5 | 17.25 | 24.5 | 5.75 | 9 | 16 | 26 | 24.5 | 20 | 8.5 | -8.5 | 17.25 | 8.75 | 6 | 11.75 | 18 | 25.5 |
| 13 | 42 | 64.75 | 163 | 45 | 34 | 15.5 | 13.5 | 14.5 | 5 | 17.5 | 56.25 | 58.25 | 3 | 9 | 16.5 | 23 | 5.25 | 9 | 16.5 | 26.25 | 26.25 | 20.25 | 8.5 | -9.5 | 17.5 | 8.25 | 5.25 | 11.25 | 18.25 | 25 |
| 14 | 42 | 63.25 | 175 | 46 | 35.5 | 15 | 14 | 14 | 5 | 18 | 55.5 | 58.75 | 3 | 8.5 | 11.5 | 21.5 | 5 | 8 | 16 | 25 | 24.25 | 21 | 7 | -7 | 17 | 9 | 5 | 10 | 14 | 23 |
| 15 | 42 | 64.5 | 163 | 44 | 37 | 15.5 | 12.5 | 14.5 | 4.5 | 18 | 56.5 | 59.25 | 4 | 11 | 14.5 | 23.5 | 6 | 9.5 | 16 | 24.5 | 25 | 20.5 | 7.25 | -7.5 | 16.25 | 8.5 | 4.5 | 11 | 15.5 | 24 |
| 16 | 41.5 | 62.25 | 160 | 45 | 36 | 15.25 | 14 | 13.5 | 4.75 | 18 | 55.5 | 56.5 | 3.75 | 9.25 | 13.25 | 21.75 | 5.75 | 9 | 14.5 | 22 | 24 | 18.5 | 8 | | 16 | 7 | 6 | 11.5 | 15.5 | 24 |
| 17 | 41.5 | 64.75 | 148 | 41 | 36.5 | 16 | 14 | 14.5 | 5 | 18 | 56 | 58.5 | 3.5 | 8 | 13.5 | 21.75 | 5 | 8 | 16.5 | 24.25 | 24 | 19.5 | 10 | | 17.5 | 8 | 5.75 | 10.25 | 16.75 | 25 |
| 18 | 41.5 | 66 | 166.5 | 43.5 | 34 | 17 | 15 | 13.5 | 5.5 | 18 | 56 | 59.5 | 3.25 | 7.5 | 14.25 | 22.25 | 5.75 | 9 | 16.5 | 25.25 | 25 | 21 | 8.75 | | 17.75 | 8.5 | 6 | 10.25 | 17 | 25 |
| 19 | 41.5 | 63 | 154 | 42 | 35.75 | 15.5 | 13 | 14.25 | 4.75 | 18 | 55.25 | 56.5 | 3.25 | 9 | 13.5 | 22.5 | 5.25 | 9 | 15.5 | 22 | 24 | 19.5 | 8.5 | | 17 | 8 | 5.25 | 11 | 15.5 | 24.5 |
| 20 | 41.5 | 60.75 | 142 | 41 | 35.75 | 15 | 13 | 14 | 5 | 18.5 | 53.5 | 54.75 | 2.75 | 8.75 | 13.25 | 22.25 | 5 | 7.25 | 15.5 | 24 | 24.5 | 20.25 | 9 | | 17.25 | 7.5 | 5.5 | 11.5 | 16 | 25 |
| 21 | 41.5 | 61 | 150 | 41.5 | 32 | 15.5 | 13.5 | 14.5 | 4.75 | 17.5 | 52.25 | 55.25 | 3 | 9 | 14.5 | 21.5 | 4.75 | 8 | 15 | 23.25 | 24.5 | 19.5 | 8.5 | -9 | 16.5 | 9 | 5.5 | 11 | 16.5 | 24 |
| 22 | 41 | 62.75 | 184 | 49 | 36 | 15 | 13 | 14 | 4.5 | 18 | 54 | 56.5 | 3 | 9 | 13 | 22 | 4.25 | 8 | 15.5 | 24 | 25.5 | 20 | 8 | -8.25 | 17 | 7.75 | 4.5 | 11 | 15.5 | 24 |
| 23 | 41 | 61.25 | 155 | 42.5 | 36 | 14.75 | 13.5 | 13.5 | 4.5 | 18 | 53 | 56.75 | 2.5 | 8.25 | 13.5 | 21 | 5.5 | 8.25 | 15.75 | 23.5 | 23.5 | 20 | 8 | -8 | 16 | 8 | 5 | 10.5 | 16 | 23.25 |
| 24 | 41 | 62.5 | 159 | 42.5 | 34 | 15.5 | 14.5 | 14 | 5 | 17.5 | 55 | 56 | 3.5 | 10 | 15.5 | 23 | 5.25 | 8.25 | 15.25 | 23 | 23 | 19.5 | 9.5 | -9.5 | 17 | 8 | 5.75 | 12 | 18 | 25.5 |
| 25 | 41 | 65 | 150 | 43 | 35 | 15.5 | 14 | 14 | 5 | 17.5 | 57.5 | 58.5 | 4 | 9.5 | 14.75 | 22.5 | 6 | 9.5 | 16.5 | 26 | 23.5 | 18.75 | 8.75 | | 16.75 | 8 | 6.5 | 12 | 17.25 | 25 |
| 26 | 40 | 66 | 153.5 | 42 | 33 | 15 | 14.5 | 12.5 | 5 | 17 | 56.75 | 59.5 | 3.75 | 8.5 | 15 | 23 | 6 | 9 | 16.5 | 26.5 | 25.5 | 20.5 | 9 | -9 | 18.5 | 9 | 6 | 11.5 | 17.7 | 26 |
| 27 | 40 | 63 | 140 | 40 | 34 | 16 | 13 | 13 | 4.5 | 18 | 54.5 | 56.75 | 3.25 | 9.5 | 13.5 | 22.25 | 5 | 9 | 16 | 24.5 | 24 | 20 | 8.5 | -8 | 17.25 | 8.25 | 5.75 | 12 | 16.5 | 25 |
| 28 | 40 | 65.5 | 163 | 42.5 | 33 | 15 | 13.5 | 14 | 5 | 16 | 57.75 | 57.75 | 4 | 9 | 15 | 23.5 | 5.25 | 8 | 15 | 23.5 | 24.75 | 19.75 | 9 | -9 | 17 | 9 | 6 | 11.25 | 18 | 26 |
| 29 | 40 | 65.25 | 145 | 40.5 | 33 | 15 | 13.5 | 14 | 5 | 17 | 57 | 57.75 | 3.5 | 10.5 | 15 | 22 | 4.5 | 8.5 | 15 | 23.5 | 25.5 | 22.5 | 8 | -9 | 16.5 | 8 | 5 | 12 | 16.5 | 23.5 |
| 30 | 40 | 63 | 168 | 45.5 | 35 | 15.25 | 14.75 | 14.5 | 5 | 17.5 | 55.75 | 57.5 | 3 | 8.25 | 13.25 | 22 | 6 | 8.25 | 15.25 | 23.5 | 25 | 19.5 | 7 | | 15.75 | 8 | 5.5 | 10.75 | 15 | 23.75 |
| 31 | 39.75 | 63.5 | 147 | 42.5 | 33 | 15.5 | 13.5 | 13.5 | 4.25 | 18.5 | 55 | 57.5 | 2.75 | 8 | 12.75 | 20.25 | 5.5 | 9 | 16 | 23 | 24.5 | 19.5 | 8 | | 15.5 | 7.25 | 5 | 10.25 | 15 | 22.5 |
| 32 | 39.5 | 61.75 | 148 | 43.5 | 33 | 15.5 | 14 | 14 | 4.75 | 16 | 53.75 | 54.5 | 4 | 7.75 | 14 | 21.25 | 5.25 | 8.5 | 16 | 23 | 23 | 20.5 | 8 | | 15 | 9.25 | 5.5 | 9.25 | 15.5 | 22.75 |
| 33 | 39.5 | 63.25 | 149.5 | 42 | 33 | 15 | 12.25 | 15 | 5 | 16.5 | 54.75 | 57 | 3.75 | 9.25 | 15 | 22.25 | 5 | 9 | 16 | 25 | 24.25 | 20 | 8.75 | -8.75 | 17.5 | 7.25 | 5.25 | 10.25 | 15.6 | 23.5 |
| 34 | 39.5 | 65 | 153 | 41 | 33 | 15 | 14 | 13.5 | 5.5 | 16.5 | 57.25 | 58.5 | 3.75 | 7.25 | 14.5 | 23 | 5 | 7.75 | 15.25 | 24 | 24 | 19.5 | 8 | -8.5 | 16.25 | 7.5 | 5.5 | 10.25 | 16.25 | 24.5 |
| 35 | 39.5 | 64 | 142 | 41.5 | 32 | 14.5 | 14 | 14 | 5 | 17 | 55.25 | 57.5 | 3 | 9.25 | 13.75 | 22 | 5.5 | 9 | 16 | 23 | 23.5 | 19 | 7.5 | -8.5 | 16.5 | 8 | 5.5 | 11 | 15.6 | 24 |
| 36 | 39.5 | 66.5 | 152 | 41 | 31 | 15.5 | 14 | 13 | 5.5 | 17.5 | 58.5 | 60.5 | 2.5 | 8.5 | 14.5 | 22.75 | 6 | 8 | 16 | 22.5 | 25.5 | 21 | 8 | -8 | 16.25 | 8.5 | 5 | 11 | 16.6 | 24.5 |
| 37 | 39.5 | 63.5 | 175 | 44 | 32 | 15 | 14 | 14 | 5 | 17 | 55.25 | 57 | 3.25 | 10 | 15 | 22 | 5 | 8 | 15.5 | 23 | 23.5 | 18.75 | 9 | -9 | 17 | 7 | 5.25 | 12 | 17 | 24.5 |
| 38 | 39.25 | 62.5 | 140 | 43 | 30.5 | 15.5 | 13.5 | 12.5 | 5 | 17 | 52.5 | 54.75 | 3.5 | 9.5 | 15 | 23 | 5.25 | 8 | 14.25 | 20.5 | 23 | 19 | 7.5 | | 15.5 | 8.5 | 5.5 | 11.5 | 17 | 25 |
| 39 | 39 | 67.5 | 165 | 40 | 32.5 | 16 | 14.5 | 13.5 | 5 | 17.5 | 57.25 | 60 | 3 | 10 | 13 | 22.5 | 5.25 | 10.5 | 17 | 25 | 25.5 | 22.25 | 9 | -9 | 17.5 | 8.75 | 5 | 13 | 16.6 | 25.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table I Continued

Additional Measurements
Size 40

| | Cap depth | Size of wrist | Cap to elbow | Elbow to wrist | Size of elbow | Width of sleeve | Inner sleeve length | Outer sleeve length | F. neck | B. neck | F. waist | B. waist | F. bust | B. bust |
|----|-----------|---------------|--------------|----------------|---------------|-----------------|---------------------|---------------------|---------|---------|----------|----------|---------|---------|
| 1 | :5.75 | :6.5 | :8.5 | :10.25 | :10 | :13.75 | :19.5 | :24.5 | :8.5 | :7 | :18.5 | :13.5 | :22.5 | :19 |
| 2 | :5.25 | :6.5 | :9.5 | :11 | :10.5 | :14 | :20 | :24.5 | :9 | :6 | :21 | :15 | :20.5 | :20.5 |
| 3 | :5 | :6.75 | :8.75 | :9.5 | :10 | :13 | :20 | :23.5 | :8.75 | :6 | :19.5 | :16.5 | :21 | :20 |
| 4 | :5.5 | :6.5 | :8.5 | :10.25 | :10.75 | :13.75 | :19.5 | :23 | :8.5 | :7 | :20 | :14 | :21 | :20 |
| 5 | :6 | :7 | :10 | :10.5 | :10.25 | :12.5 | :20.5 | :25.5 | :9 | :6 | :19 | :14 | :21.25 | :18.25 |
| 6 | :5.5 | :6.75 | :8.5 | :9.5 | :10.25 | :13 | :20 | :24 | :9 | :7 | :17.5 | :16.5 | :21 | :19 |
| 7 | :5 | :6.5 | :10 | :10 | :10 | :13 | :19.75 | :24.75 | :8 | :7 | :20 | :13 | :21.5 | :18.5 |
| 8 | :6 | :6.5 | :9 | :10.5 | :10 | :12 | :22.5 | :25.5 | :8 | :7 | :18.5 | :14.5 | :22.5 | :17.5 |
| 9 | :5.25 | :6.5 | :9 | :10.5 | :10 | :12.5 | :20 | :25.25 | :8.75 | :6.25 | :18 | :15.5 | :20 | :19.5 |
| 10 | :5 | :6.5 | :9.25 | :10.5 | :10.25 | :12.5 | :19.5 | :24 | :9 | :6 | :19.5 | :13.5 | :20.5 | :19 |
| 11 | :5.5 | :6 | :8.75 | :9.5 | :9.5 | :12.5 | :19 | :23.5 | :8 | :6.5 | :18 | :14 | :20 | :19.5 |
| 12 | :5 | :6.75 | :10 | :10.5 | :10.5 | :13 | :21 | :25.5 | :9.5 | :6 | :18 | :13 | :21.5 | :18 |
| 13 | :6 | :6.5 | :7.75 | :10.5 | :11.25 | :14 | :18.75 | :23.5 | :8 | :7 | :18 | :14 | :22 | :17.5 |
| 14 | :5.5 | :7 | :10.25 | :10.5 | :10.5 | :13 | :23.25 | :25.5 | :9 | :7 | :17.5 | :15 | :22 | :17 |
| 15 | :5 | :7 | :9 | :10 | :11.25 | :12.75 | :19 | :24.25 | :9 | :6.25 | :19 | :15 | :19.25 | :19 |

Size 42

| | Cap depth | Size of wrist | Cap to elbow | Elbow to wrist | Size of elbow | Width of sleeve | Inner sleeve length | Outer sleeve length | F. neck | B. neck | F. waist | B. waist | F. bust | B. bust |
|----|-----------|---------------|--------------|----------------|---------------|-----------------|---------------------|---------------------|---------|---------|----------|----------|---------|---------|
| 1 | :5.75 | :6.75 | :9 | :10.75 | :11.5 | :15 | :20.5 | :25.25 | :9 | :7 | :20.5 | :15.5 | :23.75 | :21.75 |
| 2 | :5.5 | :6.75 | :9 | :11 | :10.5 | :13 | :22 | :25 | :8.5 | :6.5 | :21 | :15.5 | :23.75 | :19.75 |
| 3 | :5.5 | :7 | :9 | :10 | :10.5 | :14 | :20 | :25.25 | :10 | :7 | :21 | :17 | :20.5 | :22.5 |
| 4 | :6 | :8 | :9 | :11 | :12 | :13.75 | :20 | :24.25 | :9 | :7 | :21.5 | :16.5 | :23 | :20 |
| 5 | :6 | :7 | :8 | :9.5 | :11.5 | :14 | :20 | :24.5 | :8.5 | :7 | :21.5 | :16 | :23 | :19 |
| 6 | :5.5 | :6.5 | :10 | :11 | :11 | :14 | :20.25 | :25.25 | :9 | :6.5 | :19 | :15 | :23 | :19 |
| 7 | :6 | :7 | :9.25 | :9.75 | :11.5 | :14 | :21 | :24.25 | :9 | :6 | :20 | :15.5 | :21.5 | :20.5 |
| 8 | :5 | :7 | :8.5 | :11 | :11.5 | :13.5 | :20.5 | :25 | :8 | :7.5 | :19.5 | :17.5 | :23 | :19 |
| 9 | :5.75 | :6.5 | :8.5 | :10.25 | :10 | :13.75 | :19.5 | :24.5 | :8.5 | :7 | :18.5 | :13.5 | :22.5 | :19 |
| 10 | :5.25 | :6.5 | :9.5 | :11 | :10.5 | :14 | :20 | :24.5 | :9 | :6 | :21 | :15 | :20.5 | :20.5 |
| 11 | :5 | :6.75 | :8.75 | :9.5 | :10 | :13 | :20 | :25.5 | :8.5 | :6 | :19.5 | :16.5 | :21 | :20 |
| 12 | :5.5 | :6.5 | :8.5 | :10.25 | :10.75 | :13.75 | :19.5 | :23 | :8.5 | :7 | :20 | :14 | :21 | :20 |

PATTERN STUDY AND COMPARISONS

Four commercial patterns of standard make, in each size, were used for the comparison with the norms of the corresponding measurements of the groups studied. With one exception, the companies making these patterns are found on the list accepting the standards promulgated by the Department of Commerce, Washington, D. C. A letter from that company states that their measurements now have been accepted by the Bureau of Standards. The measurements were recorded for each pattern as taken.

There is difficulty in obtaining patterns of identical style, with measurements that conform closely to the body.

Pattern A is a foundation pattern for constructing a dress form; therefore, it follows closely the body measurements. But the manufacturer reported that a small amount was added to certain of the measurements, and this was deducted before recording them in the table, so that they would be comparable with the norm.

In each of the other patterns the allowance was reported too late for deduction and partly accounts for the large differences in some cases.

Pattern B is a foundation for the princess silhouette. While it is meant to fit the body closely, it allows for freedom of movement, and does not fit with the snugness of body measurements.

Pattern B

| Size 40 | | | Size 42 | | | |
|-------------|------|-------|---------|-----|------|-------|
| | hip | bust | waist | hip | bust | waist |
| Size stated | 44 | 40 | | 46 | 42 | |
| Actual size | 46 | 43.5 | 40 | 48 | 45.5 | 41.7 |
| Standard | 43 | 40 | 34 | 45 | 42 | 36 |
| Norm | 42.5 | 40.25 | 33.7 | 44 | 42 | 35.4 |

It may be seen from the measurements above that the hip on both 40 and 42 is stated 1" larger than the standard with an additional 2" in the actual measurement. Three and five tenths inches above standard are added to the bust and there is an increase of approximately 6" in the waist. The increase from size 40 to 42 however is consistent. As the standard is practically the same as the norm, there would be considerable alteration at these points, although there is nothing on the pattern to indicate that the measurements had been increased. A letter from this company stated that an addition of 4" in waist, 3" in bust and 2" in hip had been allowed, but even if these amounts were deducted, the measurements would still be large.

Pattern C is a fitted lining, but permits freedom of movement. The following measurements show in size 40 the hip to be 2" larger than the statement on the envelop, which is standard, and the bust 3" larger while in size 42 the increase is 2.5" in each case.

Pattern C

| Size 40 | | | Size 42 | | | |
|-------------|------|-------|---------|------|-------|-------|
| | hip | bust | waist | hip | bust | waist |
| Stated size | 43 | 40 | | 45 | 42 | |
| Actual size | 45 | 43 | 36.5 | 47 | 44.5 | 38.5 |
| Standard | 43 | 40 | 34 | 45 | 42 | 36 |
| Norm | 42.5 | 40.25 | 33.7 | 43.9 | 42.17 | 35.38 |

The allowance does not increase uniformly from size 40 to size 42. Both the standard and Pattern C are larger in the hips than the computed norm. The company states that the allowance is, according to design, usually 3" to 4" larger in bust size and 4" in sleeve, but no allowance is mentioned for waist or hip, neither is there anything on the pattern to indicate that one has been made.

Pattern D is also for a tight-fitting lining, but with a still greater deviation from the standard measurements.

Pattern D

| Size 40 | | | Size 42 | | | |
|-------------|------|-------|---------|------|-------|-------|
| | hip | bust | waist | hip | bust | waist |
| Size stated | 43 | 40 | 34 | 45 | 42 | 36 |
| Actual size | 47.5 | 43 | 39.5 | 48.5 | 46.5 | 42 |
| Standard | 43 | 40 | 34 | 45 | 42 | 36 |
| Norm | 42.5 | 40.25 | 33.7 | 43.9 | 42.17 | 35.4 |

The hips are 4.5" larger in size 40 than the size stated and 5.5" larger than the norm, while in size 42 there is 3.5" increase above size stated and 4.5" above the norm. The increase of 3.5" for hips 4.5" for bust and 6" in waist in size 42 is not consistent with the allowances made in size 40. This company, in answer to inquiry regarding their measurements, states that an allowance is made of 2" in bust, 4" in waist and 2" in hip measurements, and that an increase of 2" is allowed from one size to the next larger, but nothing on the pattern would indicate the actual measurement. These deviations may cause waste of material and may prove confusing to the home dressmaker.

The variations in different makes of patterns in corresponding measurements are equally confusing. The following variations were noted:

| Size 40 | Norm |
|------------------------|-------|
| Bust 40 to 43.5 | 40.25 |
| Waist 34.5 to 40 | 33.7 |
| Hips 42 to 47.5 | 42.5 |
| Neck 13.25 to 18.75 | 15.3 |
| Chest 14 to 16 | 13.8 |
| Back width 14 to 15.75 | 13.8 |

| Size 42 | Norm |
|-----------------------|------|
| Bust 42 to 46.5 | 42.1 |
| Waist 36 to 42 | 35.3 |
| Hips 45 to 48.5 | 44 |
| Neck 13.5 to 19.5 | 15.5 |
| Chest 15.75 to 16.75 | 14 |
| Back width 15 to 17.5 | 14 |

Tables II and III show these measurements in comparison with the norms and the medians, with the probable error, under the classification: general, front, back and sleeve measurements.

Plates I, II, III showing size 40 and Plates IV, V, VI size 42 illustrate in graphic form the comparison made of the patterns with both the norms and the medians. Since the graphs show very little difference between the

mean and the median measure for this group, the arithmetical average or mean is used for the norm throughout this study.

Plates VII, VIII and IX for size 40 and X, XI and XII for size 42 illustrate by diagram each pattern superimposed upon the draft (14) of the norms of the various measurements for each group and show at a glance where the greatest deviations occur and where the most alteration would be necessary.

Plates I to VI and VII to XII show the close agreement of the measurements of length in the patterns with those of the norm. The shoulder lines, for example, with the exception of Pattern D, which is 1" longer, are almost identical. There is a slight tendency in some patterns to be longer in the waist, but on the whole there is very little increase in length measurements from size 40 to size 42.

Since the graphs and diagrams show the greatest deviations in bust, waist, hips, chest and back width, the major alterations would be necessary at these points.

The sleeve measurements compare very favorably with those of the norm, the small alteration necessary being in cap length, size of wrist and width of sleeve.

Table II
Size 40

| | General Measurements | | | | | | | | | | | | | Sleeve Measurements | | | | | | | |
|----------------|----------------------|--------------------|---------|------------------|---------|---------------------|---------------------|---------|---------|---------|--------------|-------------|---------|---------------------|---------------|--------------|----------------|---------------|-----------------|---------------------|---------------------|
| | Shoulder | Under arm to waist | Neck | Under arm to hip | Armseye | Inner sleeve length | Outer sleeve length | Waist | Bust | Hip | Front length | Back length | Height | Cap depth | Size of wrist | Cap to elbow | Elbow to wrist | Size of elbow | Width of sleeve | Inner sleeve length | Outer sleeve length |
| Probable error | : .040: | : .086: | : .060: | : .108: | : .100: | : .134: | : .106: | : .219: | : .096: | : .205: | : .222: | : .215: | : .240: | : .067: | : .046: | : .139: | : .077: | : .091: | : .105: | : .061: | : .145: |
| Average | :4.95 | :8.41 | :15.3 | :16.69 | :17.36 | :19.89 | :24.25 | :33.7 | :40.25 | :42.5 | :55.3 | :57.2 | :63.7 | 5.41 | :6.61 | :9.11 | :10.23 | :10.33 | :13.01 | :19.89 | :24.25 |
| Median | :5.17 | :8.54 | :15.47 | :16.95 | :17.7 | :19.9 | :24.39 | :32.92 | :40.25 | :42.5 | :55.37 | :59.25 | :63.75 | 5.55 | :6.79 | :9.19 | :10.85 | :10.41 | :13.15 | :19.9 | :24.39 |
| Pattern A: | 5.12 | :7.75 | :13.25 | :15 | :16.75 | :18 | :21.62 | :34.55 | :40 | :42.25 | | | | 5.12 | :7.87 | :9 | :11.25 | :11.25 | :13 | :18 | :21.62 |
| Pattern B: | 4.75 | :9.25 | :18.75 | :16.25 | :17.75 | :19.25 | :25 | :40 | :43.5 | :46 | | | | 5.75 | :8 | :8.25 | :11 | :13 | :15 | :19.25 | :25 |
| Pattern C: | 5 | :8.5 | :15.25 | :16.5 | :17.5 | :18.25 | :25 | :36.5 | :43 | :45 | | | | 6. | :8.25 | :8 | :10.75 | :12.25 | :14.5 | :18.25 | :25 |
| Pattern D: | 6 | :9.5 | :13.25 | :16.5 | :17.5 | :18.5 | :24.25 | :39.5 | :43 | :47.5 | | | | | | | | | | | |

Size 40

| | Front Measurements | | | | | | | | | | | | | Back Measurements | | | | | | | |
|----------------|--------------------|---------------|--------------------------|------------------------|--------------------|--------------|-------------------------|------------|---------------|--------------------------|------------------|-------------|------------------------|-------------------|-------------------------|--------------------|--------------|------------|---------------|------------------|-------------|
| | Neck to chest | Shoulder line | Center shoulder to chest | Between points of bust | Under arm to waist | Neck to bust | Center shoulder to bust | Chest line | Neck to waist | Center shoulder to waist | Under arm to hip | Neck to hip | Center shoulder to hip | Shoulder line | Back neck to back width | Under arm to waist | Neck to bust | Back width | Neck to waist | Under arm to hip | Neck to hip |
| Probable error | " : .061: | " : .040: | " : .058: | " : .085: | " : .086: | " : .113: | " : .133: | " : .087: | " : .107: | " : .114: | " : .108: | " : .097: | " : .132: | " : .040: | " : .062: | " : .086: | " : .092: | " : .087: | " : .240: | " : .108: | " : .173: |
| Average | :3.33 | :4.95 | :5.47 | :8.06 | :8.41 | :8.86 | :11.08 | :13.8 | :14.09 | :16.33 | :16.69 | :22.15 | :24.39 | 4.95 | :5.3 | :8.41 | :8.55 | :13.85 | :15.65 | :16.69 | :23.67 |
| Median | :3.47 | :5.17 | :5.65 | :8.25 | :8.54 | :9.1 | :11.29 | :14.09 | :14.25 | :16.54 | :16.95 | :22.3 | :24.68 | 5.17 | :5.39 | :8.54 | :8.62 | :14.12 | :15.85 | :16.95 | :23.81 |
| Pattern A: | 3.1 | :5.12 | :4.75 | :9 | :7.75 | :8.75 | :9.1 | :15.25 | :16.25 | :18 | :15 | :23.5 | :25 | 5.12 | :5.5 | :7.75 | :8.5 | :15 | :15.75 | :15 | :22.5 |
| Pattern B: | 3.5 | :4.75 | :6 | :8 | :9.25 | :7.5 | :11.75 | :16 | :16.75 | :18.1 | :16.25 | :22 | :25.1 | 4.75 | :5 | :9.25 | :8.25 | :14.5 | :16.75 | :16.25 | :23.75 |
| Pattern C: | 4.25 | :5 | :5 | :8 | :8.5 | :8.25 | :10.5 | :15 | :15.5 | :17.5 | :16.5 | :23.5 | :25.5 | 5 | :5 | :8.5 | :8.62 | :15.75 | :16.25 | :16.5 | :24.5 |
| Pattern D: | 3.75 | :6.12 | :5.5 | :8 | :9.25 | :9 | :10.5 | :15.5 | :16.75 | :18.75 | :16.25 | :24 | :25.5 | 6 | :5.5 | :9.25 | :9 | :15 | :18 | :16.25 | :25 |

PLATE I.

A COMPARISON OF PATTERNS WITH THE AVERAGE AND
THE MEDIAN OF A GROUP OF WOMEN.
SIZE 40.

38

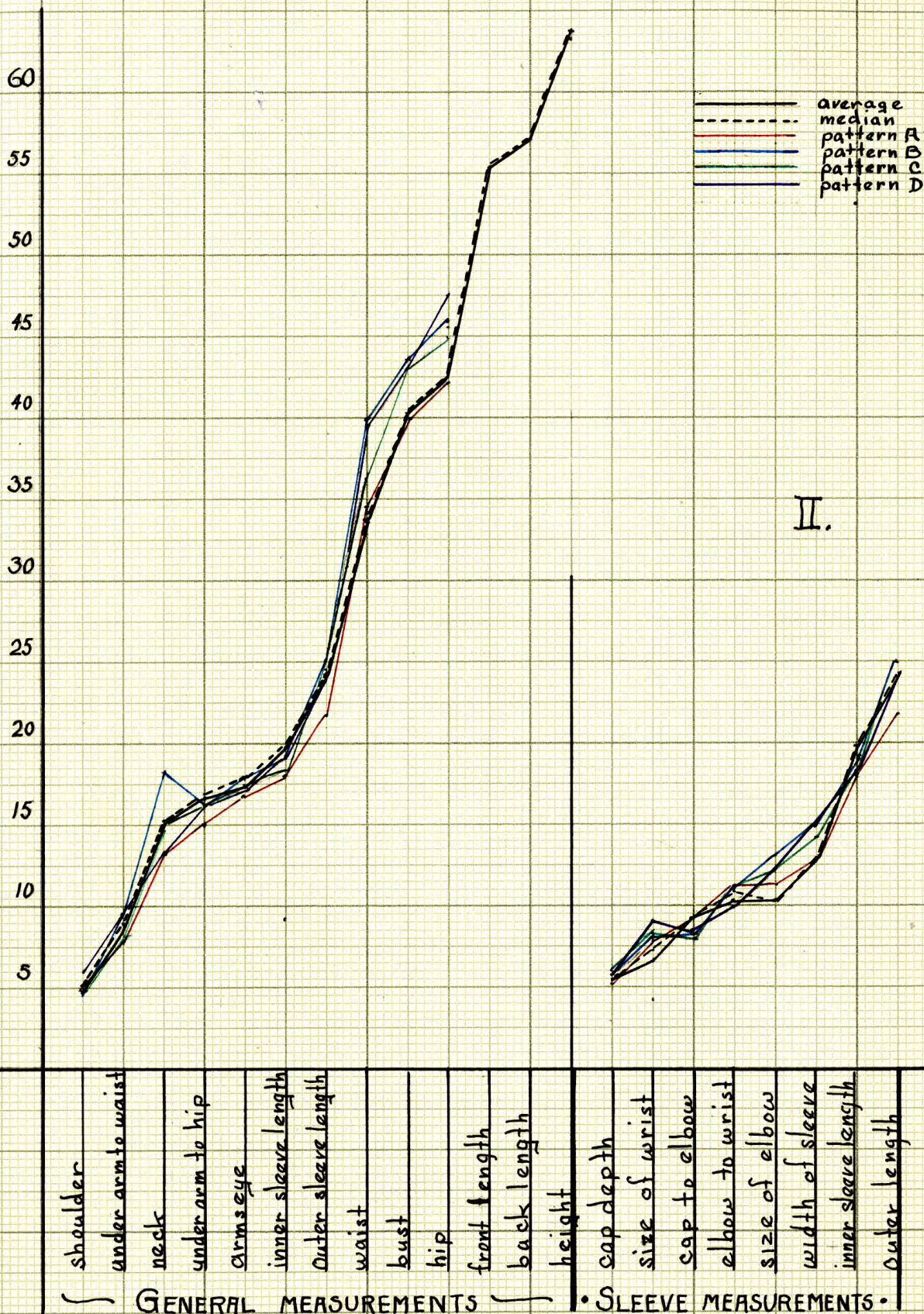


PLATE III.

A COMPARISON OF PATTERNS WITH THE AVERAGE AND
THE MEDIAN OF A GROUP OF WOMEN.
SIZE 40.

39

25

20

15

10

5

Neck to chest

Shoulder line

Center shoulder to chest

Between points of bust

Under arm to waist

Neck to bust

Center shoulder to bust

Chest line

Neck to waist

Center shoulder to waist

Under arm to hip

Neck to hip

Center shoulder to hip

Shoulder line

Back neck to back width

Under arm to waist

Neck to bust

Back width

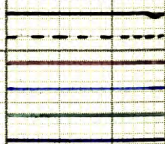
Neck to waist

Under arm to hip

Neck to hip

FRONT MEASUREMENTS

BACK MEASUREMENTS



Average
Median
Pattern
A
B
C
D

Table III
Size 42

| General Measurements | | | | | | | | | | | | | Sleeve Measurements | | | | | | | | |
|----------------------|----------|--------------------|----------|------------------|----------|---------------------|---------------------|----------|----------|----------|--------------|-------------|---------------------|-----------|---------------|--------------|----------------|---------------|-----------------|---------------------|---------------------|
| | Shoulder | Under arm to waist | Neck | Under arm to hip | Armseye | Inner sleeve length | Outer sleeve length | Waist | Bust | Hip | Front length | Back length | Height | Cap depth | Size of wrist | Cap to elbow | Elbow to wrist | Size of elbow | Width of sleeve | Inner sleeve length | Outer sleeve length |
| Probable error | : .0439: | : .0906: | : .0810: | : .074: | : .0809: | : .134: | : .0964 : | : .2225: | : .1191: | : .2859: | : .2279: | : .2306: | : .2482: | : .141: | : .081: | : .102: | : .118: | : .128: | : .101: | : .136: | : .141: |
| Average | :4.9 | :8.44 | :15.49 | :16.8 | :18.06 | :20.14 | :24.39 | :35.38 | :42.17 | :43.9 | :55.08 | :57.5 | :63.8 | : 5.56 | :6.85 | :8.91 | :10.41 | :10.93 | :13.81 | :20.14 | :24.39 : |
| Median | :5.11 | :8.59 | :15.64 | :17.13 | :18.23 | :20.28 | :24.7 | :35.87 | :42.2 | :43.7 | :55.8 | :57.5 | :63.83 | : 5.75 | :6.92 | :9.1 | :10.75 | :11.25 | :14.25 | :20.28 | :24.7 : |
| Pattern A: | 5.25 | :7.75 | :13.5 | :15 | :17 | :18.25 | :22 | :36.25 | :42 | :45 | : | : | : | : 5.5 | :8.12 | :9 | :10.75 | :11.75 | :13.75 | :18.25 | :22 : |
| Pattern B: | 4.86 | :9 | :19.5 | :16.25 | :18.5 | :19.25 | :25.25 | :41.75 | :45.5 | :48 | : | : | : | : 6 | :8.5 | :8 | :11.25 | :13.87 | :15.62 | :19.25 | :25.25 : |
| Pattern C: | 5.25 | :8.25 | :15.5 | :16.25 | :18.25 | :18.25 | :25 | :38.5 | :44.5 | :47.75 | : | : | : | : 6.25 | :8.25 | :8.5 | :11 | :13.25 | :15 | :18.25 | :25 : |
| Pattern D: | 6.12 | :9 | :14 | :16 | :17.87 | :18.5 | :24.25 | :42 | :46.5 | :48.5 | : | : | : | : 6 | :9.37 | :8.5 | :10 | :12.75 | :15.37 | :18.5 | :24.25 : |

Size 42

| Front Measurements | | | | | | | | | | | | | | Back Measurements | | | | | | | |
|--------------------|---------------|---------------|--------------------------|------------------------|--------------------|--------------|-------------------------|------------|---------------|--------------------------|------------------|-------------|------------------------|-------------------|-------------------------|--------------------|--------------|------------|---------------|------------------|-------------|
| | Neck to chest | Shoulder line | Center shoulder to chest | Between points of bust | Under arm to waist | Neck to bust | Center shoulder to bust | Chest line | Neck to waist | Center shoulder to waist | Under arm to hip | Neck to hip | Center shoulder to hip | Shoulder line | Back neck to back width | Under arm to waist | Neck to bust | Back width | Neck to waist | Under arm to hip | Neck to hip |
| Probable error | : .0569: | : .04339: | : .0693: | : .0813: | : .0906: | : .1416: | : .1170: | : .1247: | : .1821: | : .1591: | : .074: | : .1191: | : .1254: | : .0439: | : .0687: | : .0906: | : .0847: | : .0694: | : .2428: | : .074: | : .1707: |
| Average | :3.19 | :4.9 | :5.48 | :8.4 | :8.44 | :9.26 | :11.35 | :13.76 | :14.51 | :16.83 | :16.8 | :22.52 | :24.8 | :4.9 | :5.28 | :8.44 | :8.66 | :13.87 | :15.68 | :16.8 | :24.14 |
| Median | :3.28 | :5.11 | :5.66 | :8.58 | :8.59 | :9.34 | :11.46 | :13.81 | :14.55 | :17.13 | :17.14 | :22.65 | :25.18 | :5.11 | :5.43 | :8.59 | :9.02 | :14.13 | :15.79 | :17.14 | :24.25 |
| Pattern A: | 3 | :5.25 | :4.75 | :10 | :7.75 | :9.25 | :10 | :16.25 | :16.75 | :18 | :15 | :23.75 | :25 | :5.25 | :5.75 | :7.75 | :8.75 | :17.5 | :15.75 | :15 | :22.75 |
| Pattern B: | 3.5 | :4.87 | :6.25 | :9 | :9 | :8.25 | :11.5 | :16.75 | :16.75 | :19 | :16 | :22.5 | :26 | :4.87 | :5 | :9 | :8.5 | :15 | :16.75 | :16 | :23.75 |
| Pattern C: | 4.5 | :5.25 | :5.25 | :8.5 | :8.25 | :8.5 | :10.5 | :16 | :15.75 | :17.75 | :16.25 | :23.75 | :25.75 | :5.25 | :5 | :8.25 | :9.25 | :16.5 | :16.25 | :16.25 | :24.5 |
| Pattern D: | 3.75 | :6.12 | :5.5 | :8.5 | :9 | :9 | :10.5 | :15.75 | :17.25 | :19 | :16 | :24.25 | :26 | :6.12 | :5.5 | :9 | :9.12 | :16.5 | :18 | :16 | :25 |

PLATE IV.

A COMPARISON OF PATTERNS WITH THE AVERAGE AND THE MEDIAN OF A GROUP OF WOMEN.

SIZE 42.

41

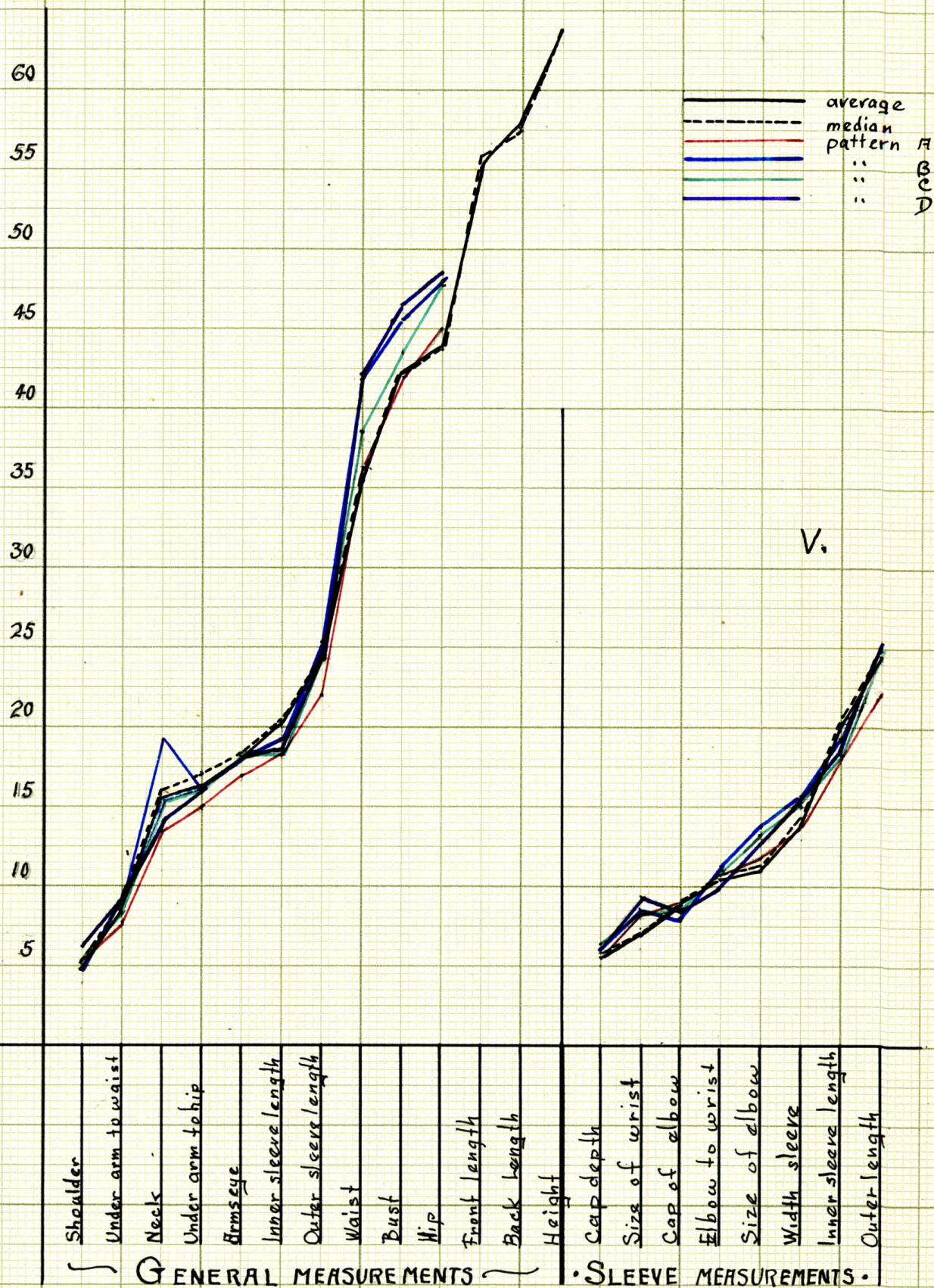
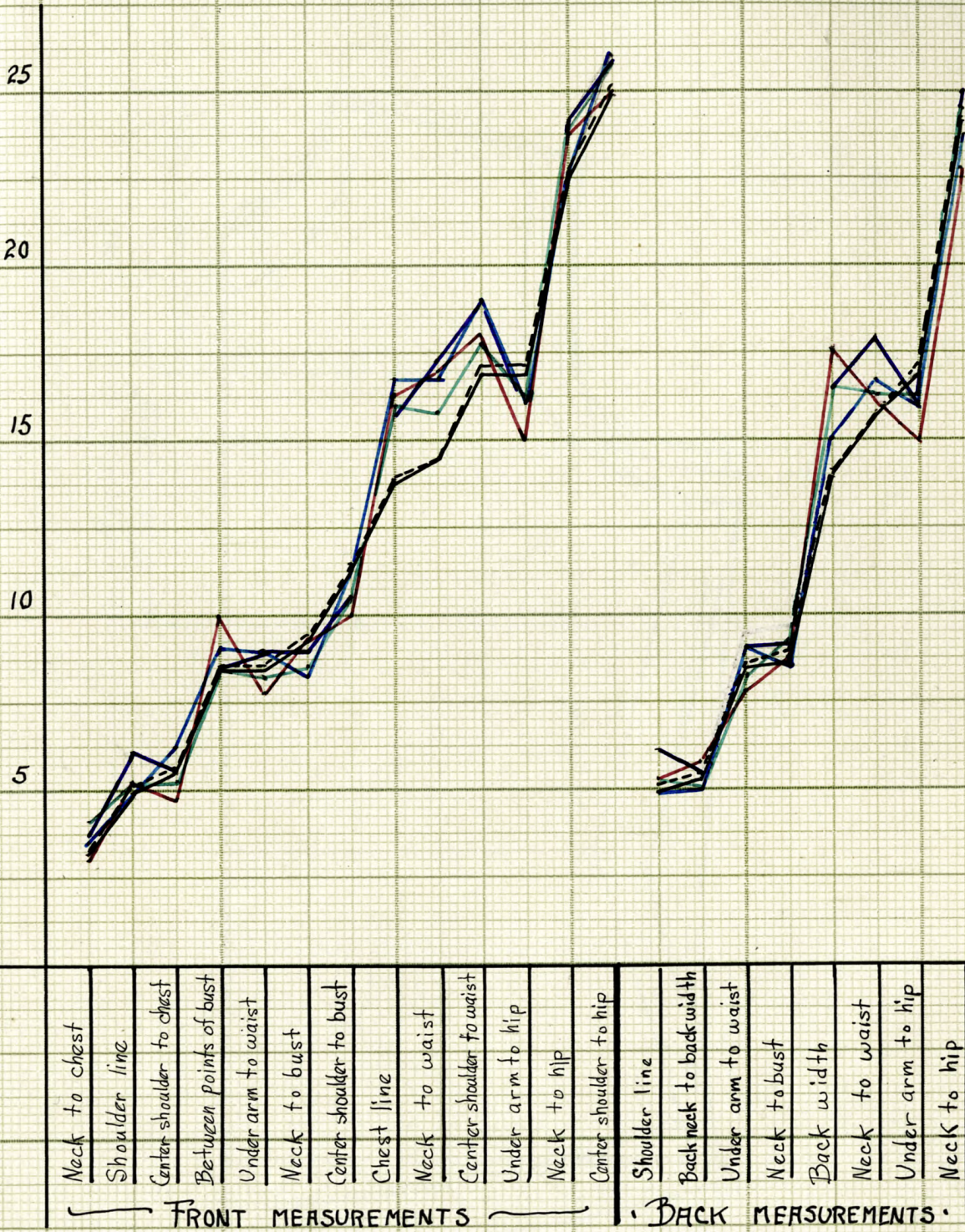


PLATE VI.

A COMPARISON OF PATTERNS WITH THE AVERAGE AND
THE MEDIAN OF A GROUP OF WOMEN.
SIZE 42.

42



— Average
 - - - Median
 — Pattern A
 — " B
 — " C
 — " D

PLATE VII

Front - Size 40

43.

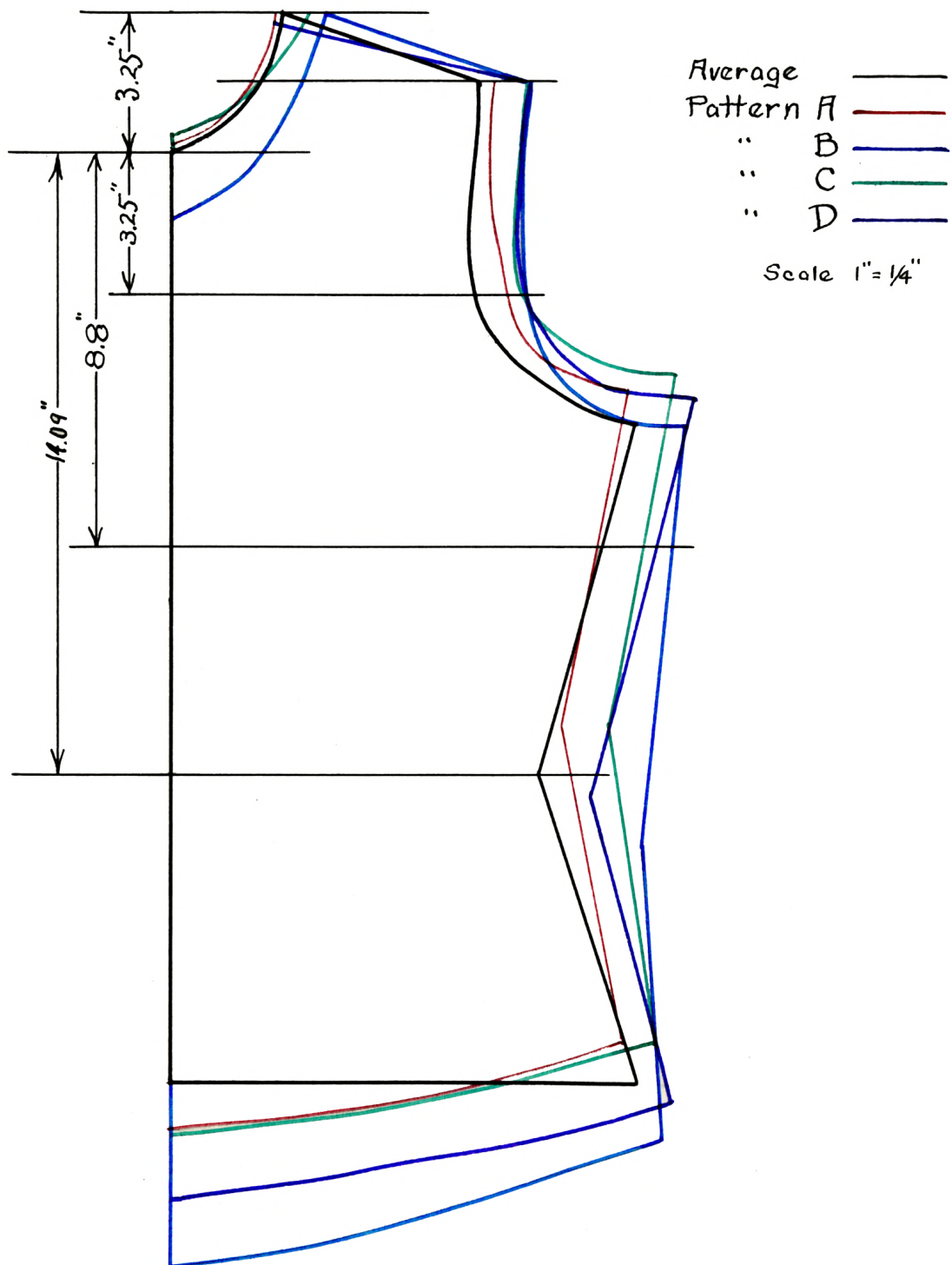


PLATE VIII

Back - Size 40

44.

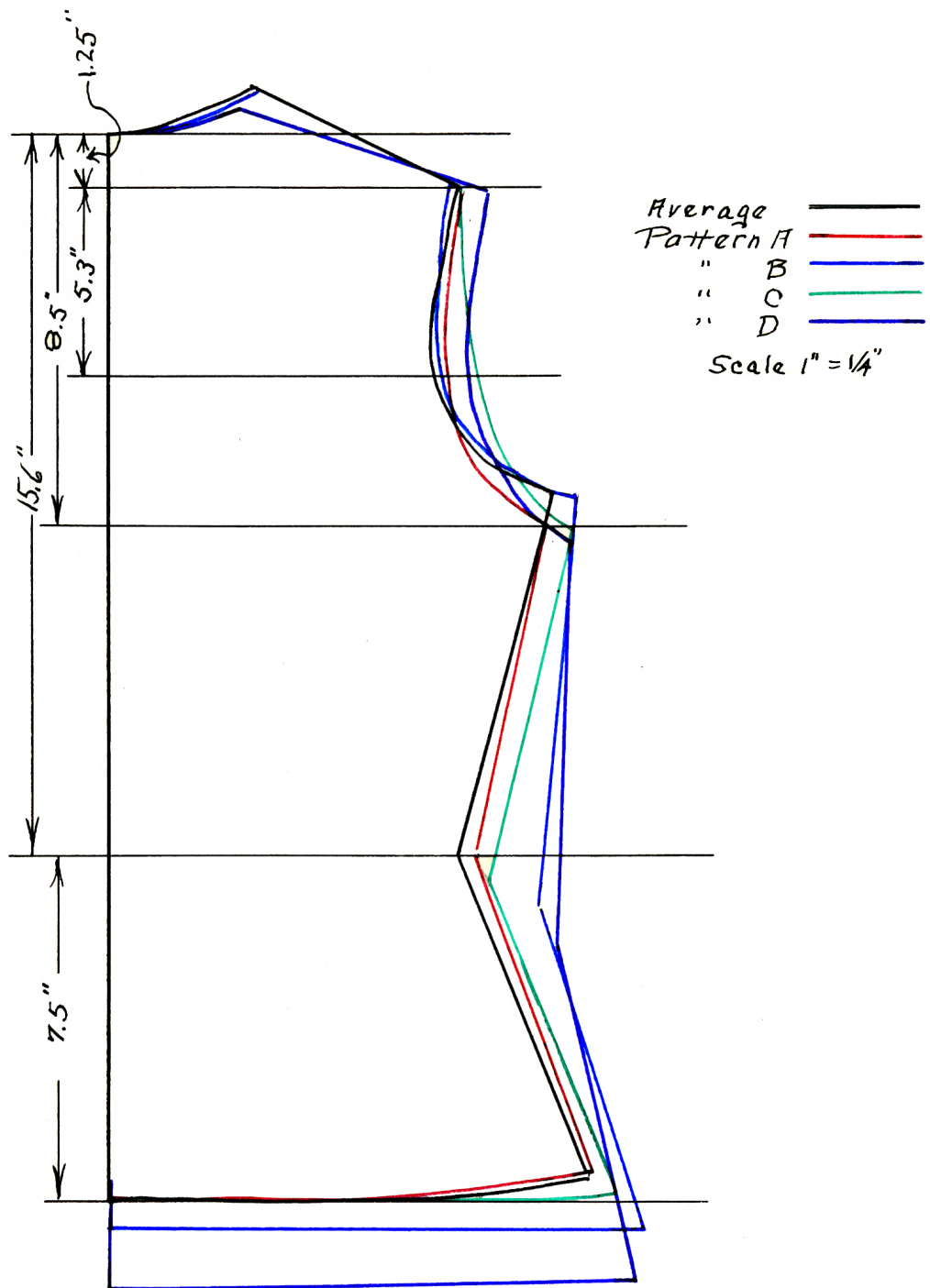


PLATE IX

Sleeve ~ Size 40

45.

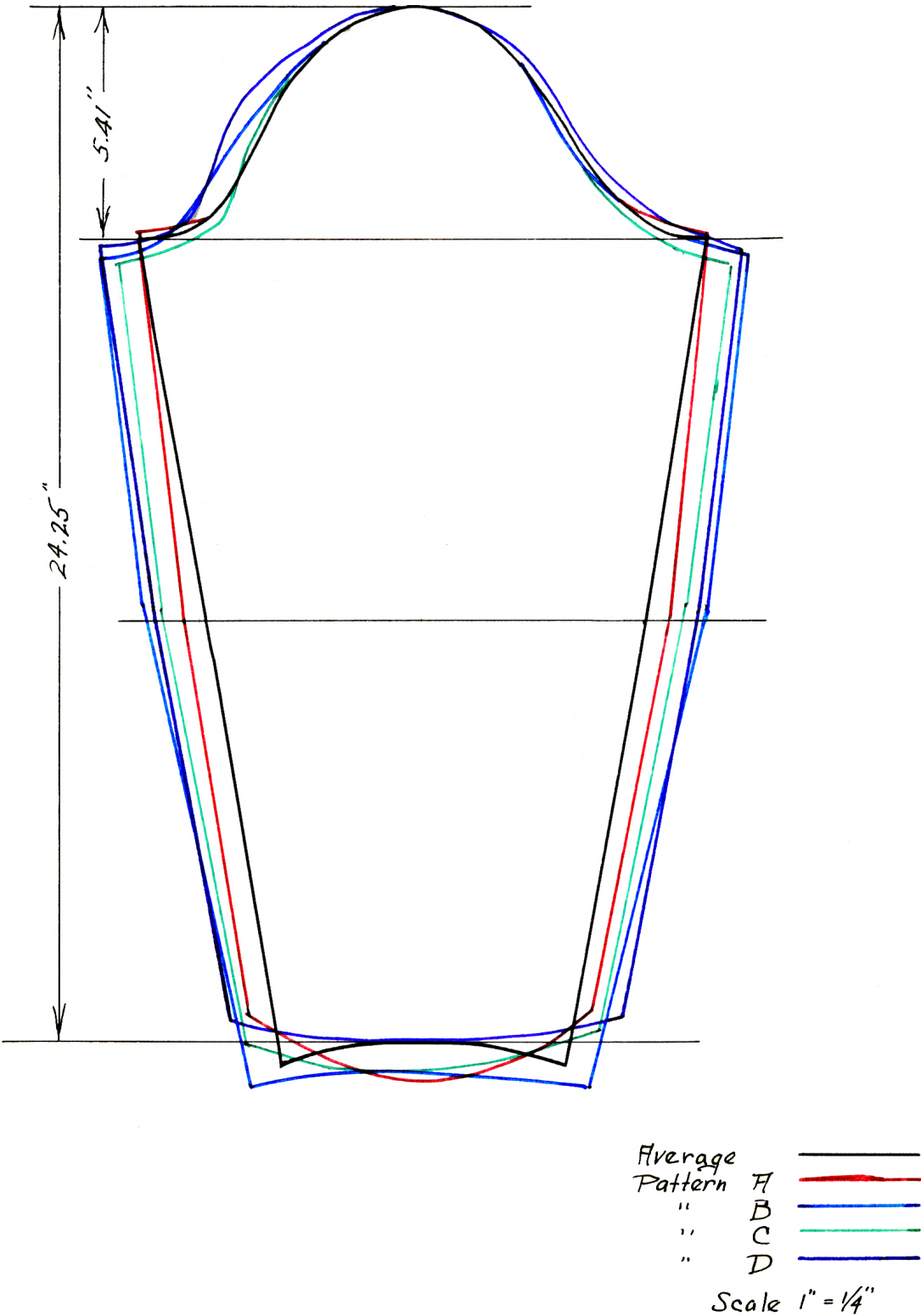


PLATE X

Front — Size 42

46.

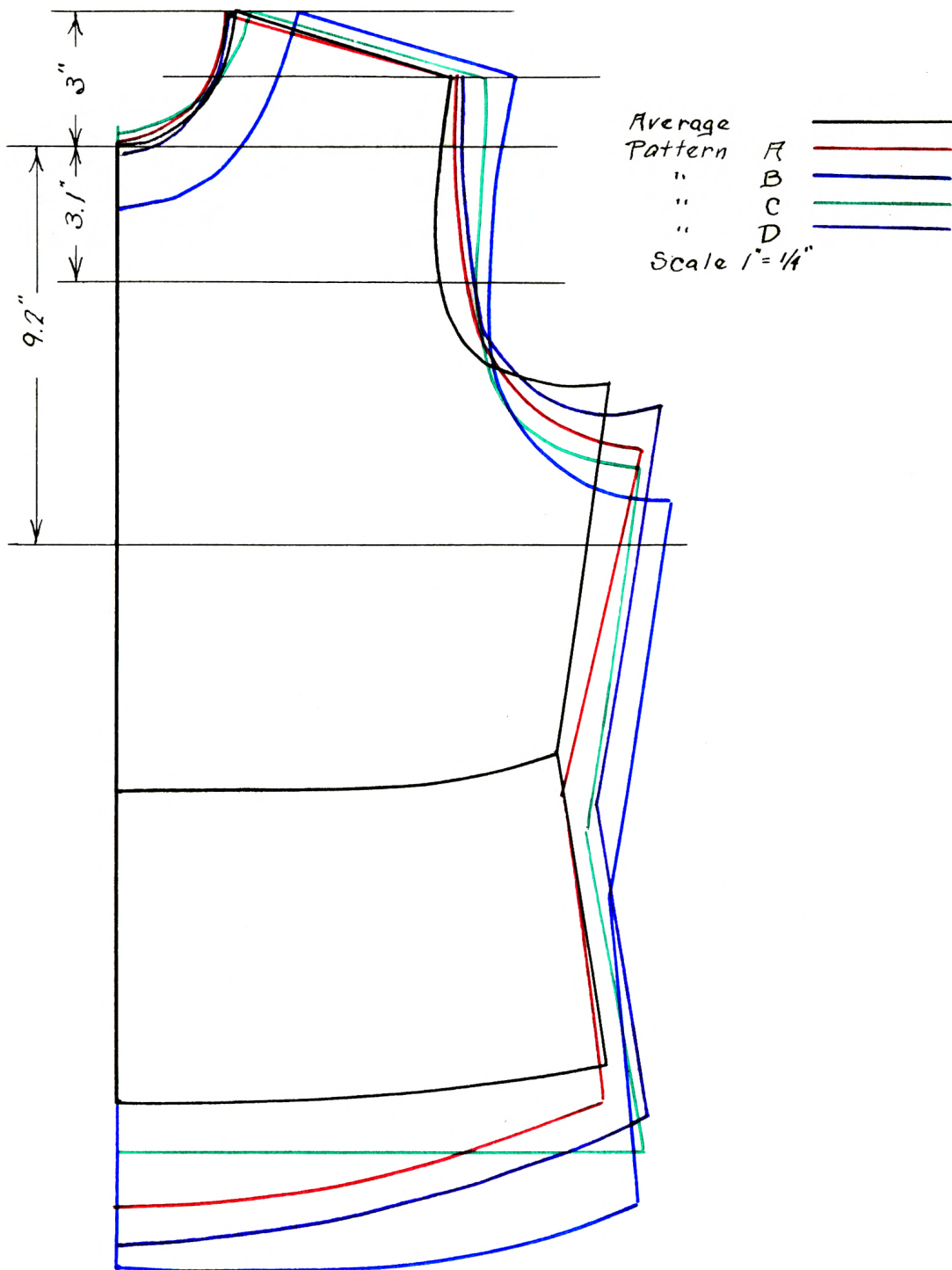


PLATE XI

Back - Size 42

47.

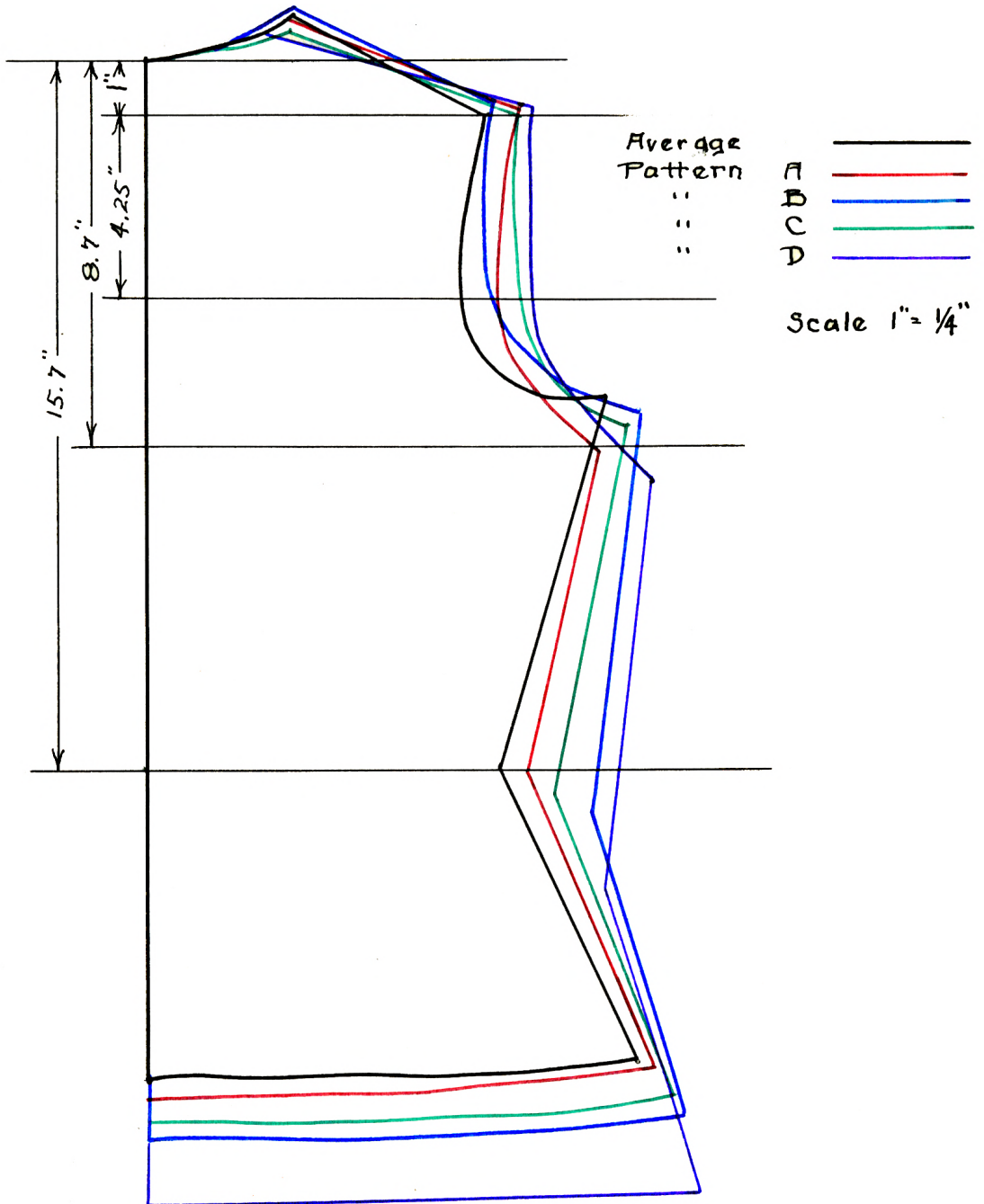
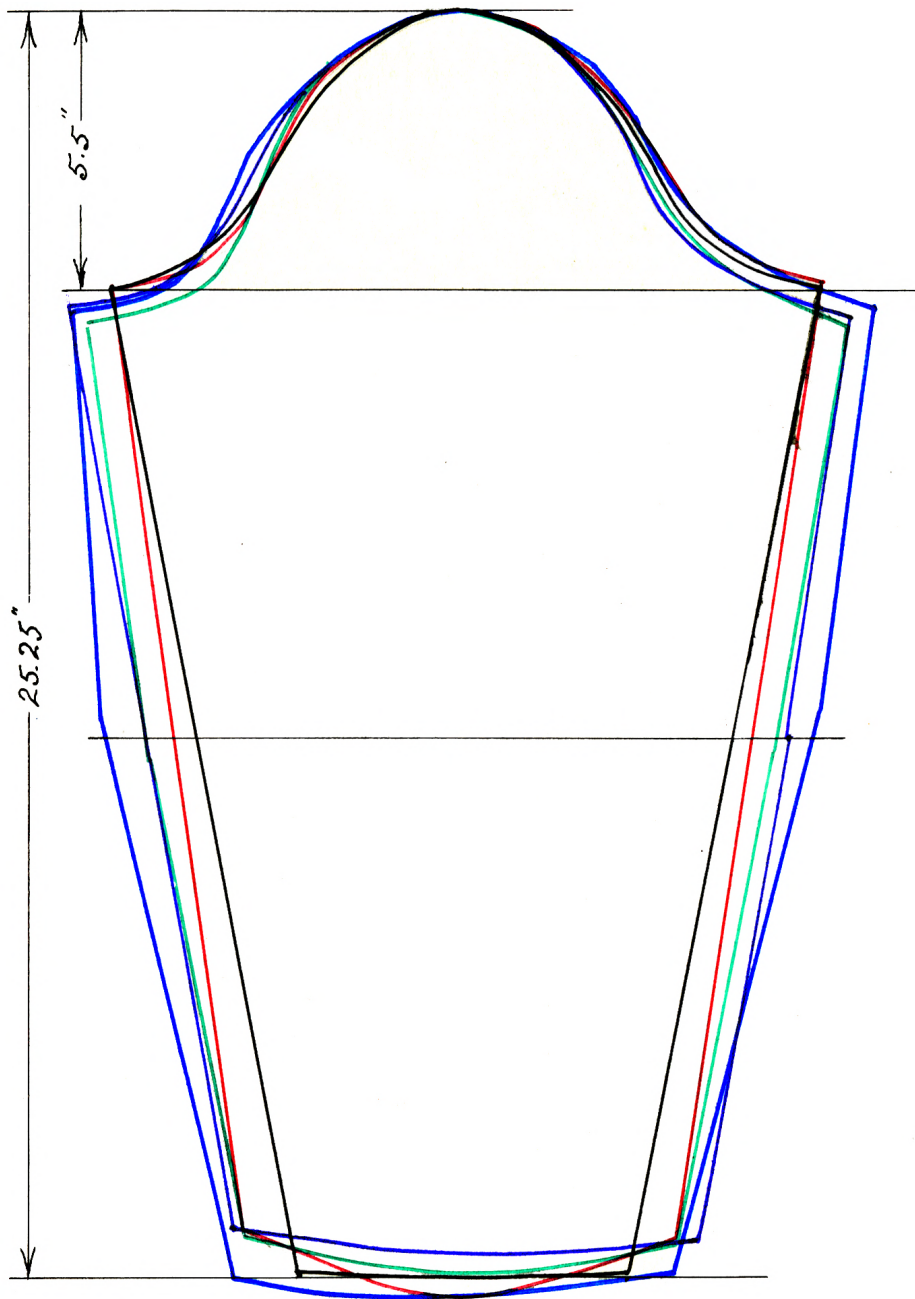


PLATE XII

Sleeve — Size 42

48.



| | | |
|---------|-----------|---|
| Average | | — |
| Pattern | A | — |
| " | B | — |
| " | C | — |
| " | D | — |
| Scale | 1" = 1/4" | |

SUMMARY

1. In the group of women studied there was shown a typical distribution of body mass which is expressed in terms of the norm for each body measurement taken.

2. The analysis reveals the greater percentage of individual measurements of both groups to cluster closely about the norm of the corresponding size, large deviations being the exception rather than the rule.

3. Less variation was shown in the longitudinal measurements than in the girth and width measurements. Significant variations from the norm were found in hip, waist and bust measurements of certain individuals.

4. The computed norm for the bust, waist and hip line measurements of the groups conforms closely to the standardized measurements on file at the Bureau of Standards, Washington, D. C.

5. Corresponding measurements of the same size vary in different makes of patterns.

6. Patterns of the same make do not always show a consistent increase of the same measurement in different sizes.

7. Pattern companies definitely indicate the waist line but not the chest, bust or hip line, where the greatest variations occur. Neither do they indicate the allowance above their printed standard. Patterns adding such large amounts as shown in some cases throw their measurements entirely outside the range for the majority. This is confusing to the unskilled seamstress and results in change of line, misfits and often waste of material.

CONCLUSIONS

It appears, then, that by finding the measure of central tendency of groups having certain qualities, a standard may be established which will fit the greatest number of individuals in that group. Such a standard would be scientific in the sense that it would have been made up from the norms of the various measurements and that it would require a minimum of alteration.

The accepted standard for any pattern size should be the norm or average measurement of a large group (at least 1000) of women of a given size, height and weight.

The standard measurements, reached by the agreement of manufacturers without actual measurement of women, and on

file in the Department of Commerce, Washington, D. C. check closely with those determined by this study as the norm for sizes 40 and 42.

Further standardization is needed, particularly in girth and width measurements of mature women, so that a minimum of alteration will be needed for the majority in this size. Standardization, as a means of eliminating waste of material, would be an economic benefit to the consumer and the manufacturer.

Deviations in the sizes of commercial patterns even in those printing the standard on the envelop are so great as to cause much confusion, disappointment, and waste on the part of the one using the patterns.

Pattern companies should definitely indicate the allowance above standard made on each measurement, and should conform to the standard printed on the envelop. The value of a pattern would be increased if the chest, bust and hip lines were as definitely marked as the waist line is indicated on patterns.

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